

Title: Data By the Sea

**Brief Overview:**

This lesson is designed to give students hands-on practice and review of tally marks with gate counting. Students will also be involved in creating and interpreting pictographs. Students will be actively engaged in this “fish” theme that integrates mathematics, literature, and art.

**NCTM Content Standard/National Science Education Standard:**

Data Analysis

**Grade/Level:**

Grade 2

**Duration/Length:**

Two days (60 minutes per day), one day for assessment.

**Student Outcomes:**

Students will:

- Collect, organize and display data.
- Organize and display data to make pictographs using scales of 1:1 and 2:1.
- Collect and record data on tally charts.

**Materials and Resources:**

**Teacher Note:** This lesson should be done in conjunction with at least one other teacher. On day two the classes will exchange pictographs and compare data.

**Day 1:**

- Rainbow Fish by Marcus Pfister
- Crab Races Held in Chesapeake, Maryland transparency, Teacher Resource 1
- Every Pupil Response pinch card (one per student), Student Resource 1 (Cards should be cut and folded before distributing.
- Pre-cut construction paper fish (1 per student) using pattern from Teacher Resource 2
- Materials to decorate fish (ex: pom poms, markers, pipe cleaners, pasta)
- White glue
- 5’ to 7’ long piece of bulletin board paper to create class pictograph
- Blank horizontal pictograph (two per student), Student Resource 2

- Student Resource 3
- Chart Paper
- Markers

### **Day 2:**

- Seashell Showdown (transparency and one per student), Student Resource Sheet 4
- Blank vertical pictograph (one per student), Student Resource Sheet 5
- Baggie of goldfish crackers (one per student) containing 6 plain, 8 pretzel and 12 cheddar goldfish crackers.
- Two large plastic hula hoops
- Three sentence strips
- Blank Venn diagram, Student Resource 6 (one per student)

### **Day 3:**

- Summative assessment (one per student)

### **Development/Procedures:**

#### **Lesson 1 .....** **Pre-Assessment –**

- Tell students that they will be learning about data over the next few days.  
Ask: “*Does anyone know what data is?*” Elicit answers from students.  
Say: “*Who remembers what tally marks are?*” Elicit answers from students.  
Say: “*Who can tell me about pictographs?*” Elicit answers from students.
- Distribute Every Pupil Response Cards, Student Resource 1 (one per student). Tell students that you want to see how much they already know about pictographs.
- Display transparency of Teacher Resource 1, Crab Races Held in Chesapeake, Maryland on the overhead. Tell students to use their cards to show the answer each question as it is asked.
- Ask questions such as the following:
  - Were the most races held in June?
  - Were 8 races held in August?
  - Did May have two more races than April?
  - Were a total of 10 races held in May and July?
  - Were 29 races held altogether?
- Teacher should observe student responses during this activity to help determine which students need additional support and which may need enrichment.

### **Launch-**

- Read and briefly discuss the book Rainbow Fish, by Marcus Pfister.

- Tell students that each of them will be decorating their own fish and that they will use the fish to create a pictograph. Show the students each of the four materials that they may use to decorate their fish. Tell students that they must decide on the one material that they would like to use on their fish.
- Tell students that you need to make sure that you have enough of each material, so you will need their help in tallying how many students in the class want to use each material.
- Draw a tally chart on the chalkboard as shown below:

Material	Number	Tally
Pom poms		
Markers		
Pipe cleaners		
Pasta		

- Tell students that you have forgotten how to make tally marks and will need their help. Invite students to remind you how to show each number with tally marks as each vote is taken. Be sure to have students explain that a gate must be drawn for each fifth tally.

#### Teacher Facilitation –

- Distribute one construction paper fish, Teacher Resource 2, to each student and allow students 5 minutes to decorate their fish using glue and the material that they selected during the launch activity.
- Invite students to bring their decorated fish and sit on the floor in an open area circling the large piece of bulletin board paper.
- Say: *“Everyone did an excellent job decorating the fish, but it’s hard for me to see how each person decorated theirs. If we create a pictograph with our fish do you think that will help us to see how each person chose to decorate their fish?” Why?’* Elicit answers from students.
- Draw an x and y-axis for the graph on the chart paper. Tell students that all graphs need certain things to be mathematically correct. Ask: *“Does anyone know what parts a pictograph needs?”* Elicit answers from students. As pictograph parts are given add each to a word bank that students can refer to as needed during the unit. Provide hints if necessary. Be sure that students include: title, categories, and key. Add each part to the class pictograph as it is named. Ask: *“Does a pictograph need to go horizontally or vertically? Does the data change depending on which way it goes?”* Tell them that this time we will be creating a horizontal pictograph. Be sure to ask for student input as to what the title and categories should be. Tell students that for this pictograph each fish picture will represent one vote.
- Name one category at a time and have the students that used that material to decorate their fish glue their fish to the class pictograph in the correct category. Continue with all categories. Tell students that the symbols on this pictograph are fish. Ask: *What do you think the pictograph symbol*

*might be if we were trying to see what type of shoes everyone was wearing? What everyone brought for lunch? Etc.*

- Ask: “Who can tell me something that they notice about the data in our fish pictograph?” Elicit answers from students. You may choose to chart students’ responses.
- Tell students that tomorrow they will be doing something different with their pictograph, so they will need to make their own individual version of it so that they can remember the data.
- Distribute blank pictograph to students (Student Resource 2). Have students copy all components of the graph onto their paper. Show students how to draw a quick fish so that they can illustrate the fish on their pictograph. Discuss why it is important for all of their fish to be drawn about the same size.
- Collect students’ individual pictographs for use tomorrow.

#### **Student Application –**

- Distribute blank horizontal pictograph, Student Resource Sheet 2 and Student Resource 3 to students.
- Tell them that you want to see how much they learned about pictographs. Have students complete the sheet being sure to include all of the parts of a pictograph. Observe students as they work.
- Answer key can be found on Teacher Resource 3.

#### **Embedded Assessment –**

- Teacher observation of students as they complete Student Resource 3.

#### **Reteaching/Extension –**

- For those who have not completely understood the lesson, teacher or assistant may choose to work with them in a small group as they complete the student application sheet.
- For those who have understood the lesson, allow students to use a graphing software program such as “Graph Club” or “Graphers” to recreate the class pictograph if they finish early or during center time.

## **Lesson 2**

#### **Preassessment –**

- Distribute one copy of Seashell Showdown, Student Resource 4 to each student and display the transparency on the overhead projector.
- Remind students that yesterday they reviewed tally marks. Tell them that you want to see how much they remember by having them complete the Seashell Showdown Sheet. Provide time for students to complete the sheet individually. Once complete, you may choose to check a few or all examples together using the transparency to check for understanding.
- Collect student papers to check for individual understanding.

### Launch –

- Tell students that today we will be doing more pictograph activities. Ask: *“Who likes to eat goldfish crackers? What kind to you like? I have some goldfish for each of you, but the kinds have been accidentally mixed up. I would like each of you to help create a pictograph so that you can see easily how many you have of each type.”*
- Distribute baggies of goldfish crackers to students along with one copy of the Blank Vertical Pictograph, Student Resource 5.
- Say: *“Yesterday our pictograph went horizontally. Does this graph go horizontally? Can pictographs go either way? Does the data change?”*
- Tell students that you want to make sure that they remember how to construct pictographs so you would like them to sort their goldfish crackers onto their pictograph sheet and then include all of the parts of a pictograph on their sheet. Review how to organize a pictograph based on the previous day’s lesson. Allow time for students to work.
- Ask questions such as the following:
  - Which type of cracker has the most? The least?
  - How many more pretzel fish are there than plain?
  - How many fewer pretzel fish are there than cheddar?
  - How many fish are there in all?
- Ask: *“How many does each fish represent right now? (1) What do you notice is happening to our pictograph? (The fish are going off the graph) What can we do about that? If we eat some are we still representing the same data?”*
- Tell students that right now our key is one fish represents one cracker. Sometimes pictographs have keys that show one symbol that represents 2 votes. Ask: *“How will that change our data if we use only one cracker to represent two fish? How can we count these? So instead of 6 plain goldfish crackers, how many will we put on our pictograph? (3) Why? Instead of 8 pretzel fish how many will we put on? Why? Instead of 12 cheddar fish how many will we put on? (6) Why? What if there were 7 pretzel fish instead? Then how many would we need? (3.5) How would we show 3 ½?”*

### Teacher Facilitation –

- Gather students in an open area on the floor. Remind students of the decorated fish pictograph that they created yesterday. Distribute individual copies of Student Resource 2 from yesterday. Say: *Remind me of something that our fish graph data told us.*
- Tell students that another class in your grade also created a decorated fish pictograph yesterday. Ask: *“Do you think their results will be the same or different from yours?”*
- Show students the pictograph created by the other class. Say: *“Take a minute to look at the pictograph. Think about how theirs is the same and different than ours.”*

- Ask: *“What visual organizer can we use to compare similarities and differences?”* (Venn diagram)
- Say: *“Today we are going to use two hula hoops to represent our Venn diagram. What will information on the left side of the Venn diagram represent? (our class data) What will information on the right side of the Venn diagram represent? (the other classes’ data) What will go in the middle? (data that is the same on both pictographs).”*
- Ask: *“Who can tell me something that is different about our fish pictograph?”* Write it on a sentence strip as student dictates. *“Where should I put this on the Venn diagram? Who can tell me something different about the other classes’ pictograph?”* Write it on a sentence strip as student dictates. *“Where should I put this on the Venn diagram? Who can tell me something that is the same on both class pictographs?”* Write it on a sentence strip as student dictates.
- Have students copy each statement in the correct area on their individual copy of the Venn diagram, Student Resource 6, as you write.

#### **Student Application –**

- Send students back to their seats with the direction to continue their Venn diagram by adding at least one additional sentence in each section.
- Circulate and provide assistance as needed.
- Once students have completed the task, discuss with the class some of the similarities and differences that they noticed.

#### **Embedded Assessment –**

- Teacher observation of students during student application activity, review of student’s Venn diagram and observation of students during class discussion of similarities and differences.

#### **Reteaching/Extension –**

- For those who have not completely understood the lesson, you or an assistant may choose to work with them in a small group as they complete the student application sheet.
- For those who have understood the lesson, demonstrate how to write number sentences or comparisons based on the data from the Venn diagram or actual graph. Ex: Our classes’ pipe cleaner fish > their classes’ pipe cleaner fish.

#### **Summative Assessment:**

Students will complete the assessment activity on Student Resource 7. Answer key may be found on Teacher Resource 5.

#### **Authors:**

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Yes



Yes



No



No



Name \_\_\_\_\_

Student Resource 2

\_\_\_\_\_

\_\_\_\_\_

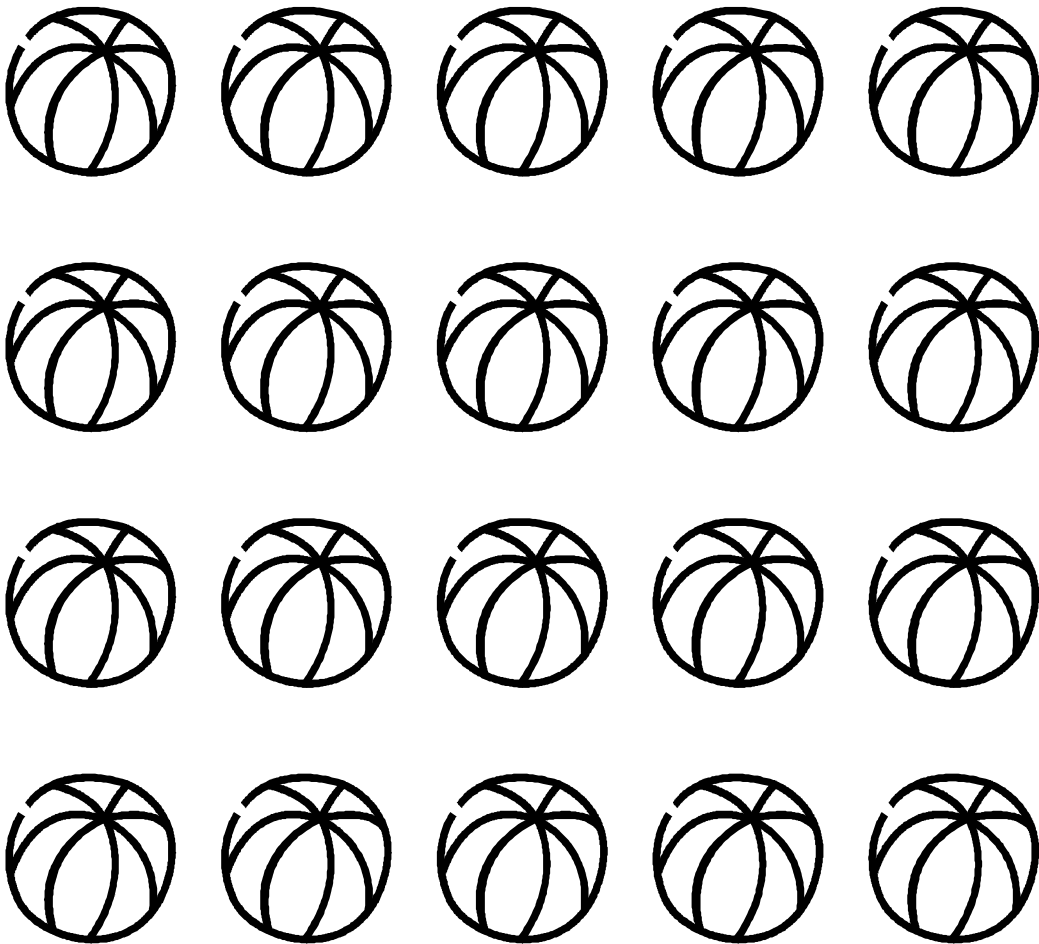

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Name \_\_\_\_\_ Date \_\_\_\_\_

Make a pictograph:














- Color the beach ball as follows: 6 red, 10 blue, and 3 green.
  - Cut and glue them onto your graph paper.
  - Label your graph with all of the components it needs.
- \*\* Each beach ball represents one .**



Name \_\_\_\_\_ Date \_\_\_\_\_

**Seashell Showdown**

Count the number of shells and then write the tally marks and number in the correct box.

Picture	Tallies	Number
		
		
		
		
		
		
		
		
		
		
		
		
		

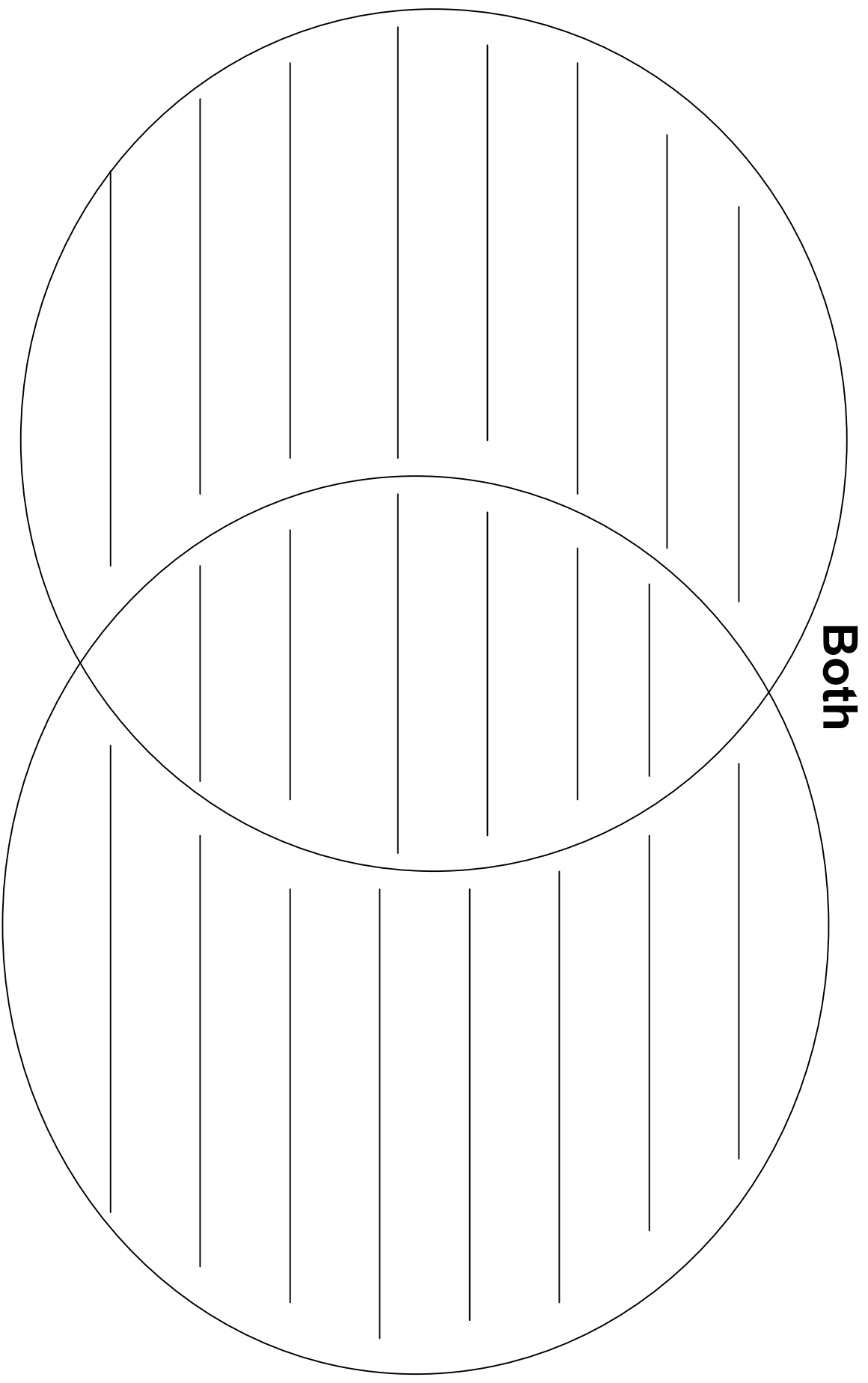
Student Resource 5

\_\_\_\_\_


\_\_\_\_\_

Name \_\_\_\_\_ Date \_\_\_\_\_




















Name \_\_\_\_\_



Name \_\_\_\_\_ Date \_\_\_\_\_

## Summative Assessment

Using the graph below, answer the following questions.

Friday	     
Saturday	       
Sunday	  
Monday	     

Key  = 2

1. What does this pictograph need?

- ☐ Key
- ☐ Symbols
- ☐ Title
- ☐ Categories

2. How many starfish were found on Monday?

- ☐ 3
- ☐ 6
- ☐ 8

☐ 12

3. How many more starfish were found on Saturday than Sunday?

- ☐ 5
- ☐ 10
- ☐ 12
- ☐ 20

4. How many starfish were found altogether?

- ☐ 46
- ☐ 32
- ☐ 23
- ☐ 12

5. Use what you know about pictographs to tell 2 more facts about the starfish data?

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6. Draw tally marks to match each number below.

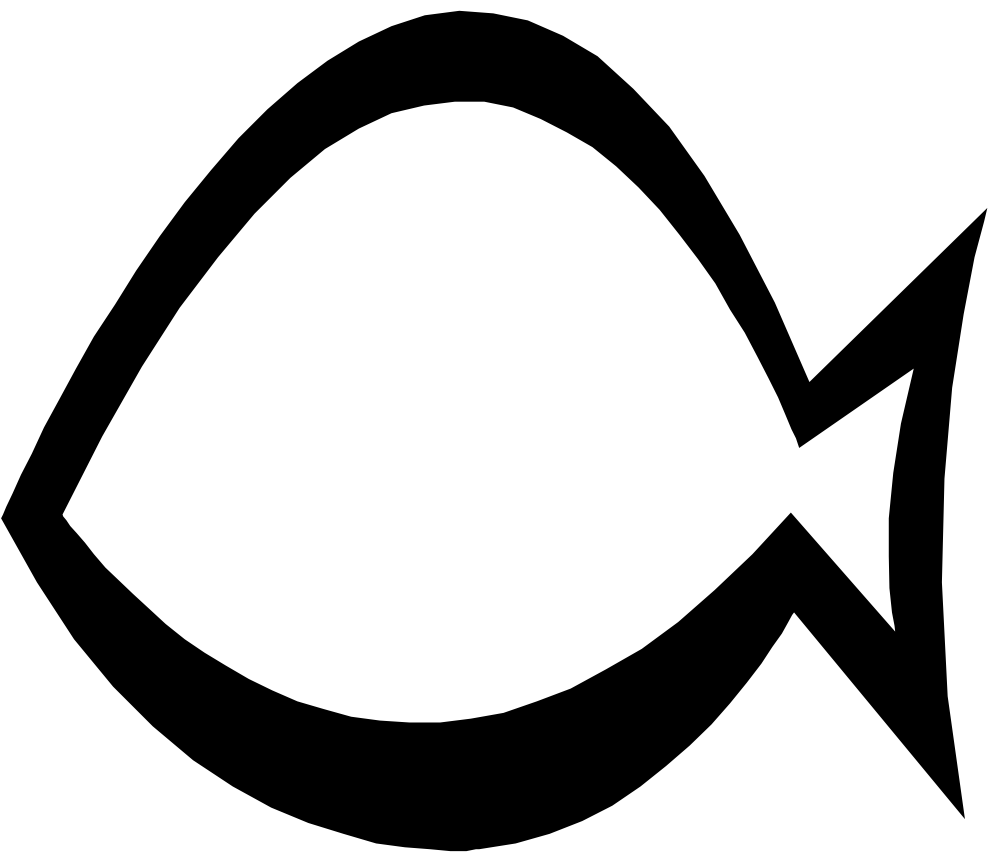
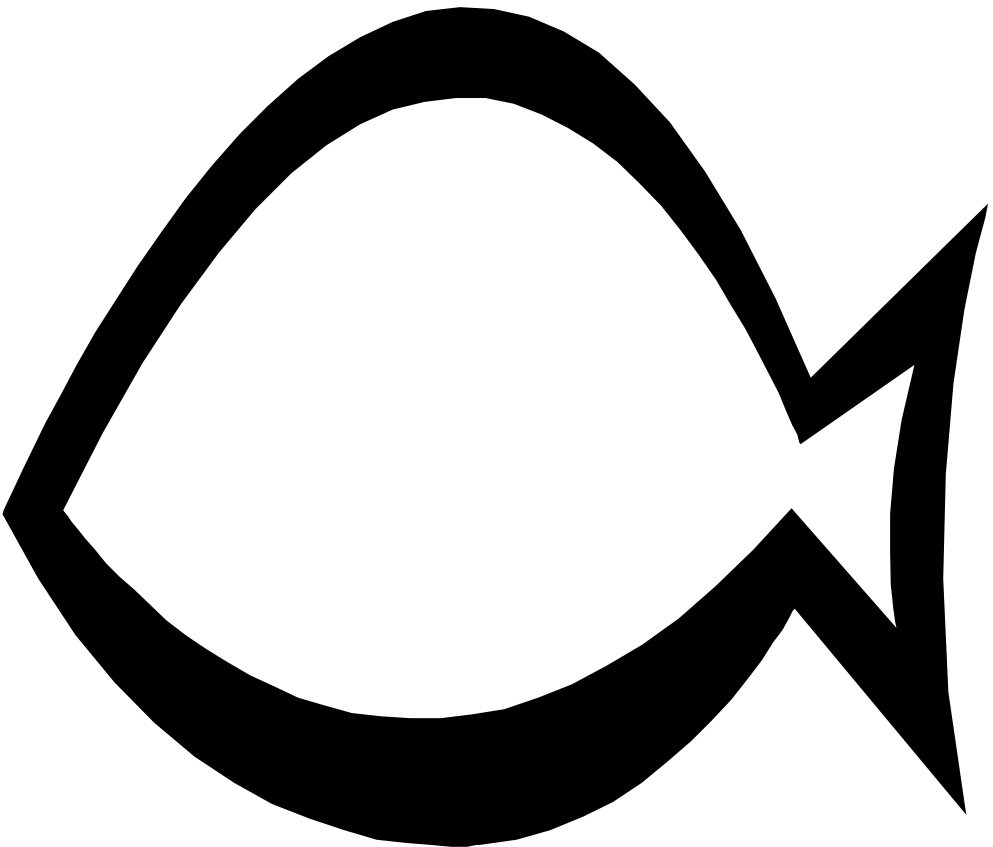
Number	Tally Marks
8	
11	
5	
19	
6	
20	
3	
7	

## Crab Races Held in Chesapeake, Maryland

April	 
May	   
June	      
July	     
August	       
September	    

 = 1 crab








Name \_\_\_\_\_

**Answers will vary**

Teacher Resource 3

**Beach Ball Colors**

<b>red</b>	 = <b>6</b>
<b>blue</b>	 = <b>10</b>
<b>yellow</b>	= <b>0</b>
<b>green</b>	 = <b>3</b>











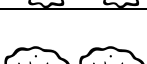


**Key**  = 1 ball

Name \_\_\_\_\_

Date \_\_\_\_\_

**Seashell Showdown**














Count the number of shells and then write the tally marks and number in the correct box.

Picture	Tallies	Number
		4
	<del>    </del>	9
	<del>    </del>	6
	<del>    </del> <del>    </del> 	13
		1
	<del>    </del> <del>    </del> 	12
	<del>    </del> <del>    </del>	10
	<del>    </del>	5
	<del>    </del>	7
	<del>    </del>	8
	==	2
	<del>    </del> <del>    </del>	11
		3

Name \_\_\_\_\_ Date \_\_\_\_\_

## Summative Assessment

Using the graph below, answer the following questions.

Friday	     
Saturday	       
Sunday	  
Monday	     

Key  = 2

7. What does this pictograph need?

- ☐ Key  
☐ Symbols  
☒ Title                      1 point  
☐ Categories

8. How many starfish were found on Monday?

- ☐ 3  
☐ 6  
☐ 8  
☒ 12                      1 point

9. How many more starfish were found on Saturday than Sunday?

- ☐ 5  
→ ☐ 10                      1 point  
☐ 12  
☐ 20

10. How many starfish were found altogether?

- ☐ 46                      1 point  
☐ 32  
☐ 23  
☐ 12

11. Use what you know about pictographs to tell 2 more facts about the starfish data?

*Answers will vary - 1 point for each correct fact.*

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12. Draw tally marks to match each number below.  
-  $\frac{1}{2}$  point each.

Number	Tally Marks
8	<del>    </del>
11	<del>    </del> <del>    </del>
5	<del>    </del>
19	<del>    </del> <del>    </del> <del>    </del> 
6	<del>    </del>
20	<del>    </del> <del>    </del> <del>    </del> <del>    </del>
3	
7	<del>    </del>